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the time in either test singly, the experiment is brought into line with the speed of reading tests. For a series of single observations, the result is rather suggestive. Important isolated exceptions occur for the colors in subjects *6* and *11*, and in *10* for the names. The ratios, however, are simply chaos, just as were those in the previous experiment. The writer has examined the ratios with reference to other traits in certain of the subjects, but no correspondence with any factor of character is observable. The two perhaps most temperamentally similar subjects of the experiment—*3* and *4*—are nearly the most different in their ratios. There seems to be good theoretical ground to discredit the ratio as a desirable form in which to state results of this nature, for besides being highly subject to attenuation, it puts a premium on the subject's doing badly in one of the tests.

Most of the results are therefore negative. Two factors appear related to intellectuality: the speed of absolutely controlled association and its constancy relative to that of other individuals over a similar series. High speed and low variability go with intellectuality, low speed and high variability with the reverse; both high or both low are doubtful, but seem to be associated rather with the latter. To all these generalizations, however, one must be prepared for striking individual exceptions.

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REVIEWS AND ABSTRACTS OF LITERATURE

Die Erkenntnistheorie der Naturforschung der Gegenwart: H. KLEINPETER, Ph.D. Leipzig: Johann Ambrosius Barth. 1905. Pp. xii + 156.

" The work before us agrees in general with the views as to the nature of knowledge expressed by Mach, Kirchhoff, Hertz, Stallo, Clifford, Pearson, Ostwald and Cornelius" (p. xi). It is dedicated to Ernst Mach. A theory of knowledge has developed in the second half of the last century on the basis of the exact sciences, and the author proposes to give it a much-needed systematic presentation. His method is neither historical nor critical, although he assumes a very critical attitude toward the science of metaphysics and the traditions of philosophy. Our only means of testing the correctness of views is through further experience, and this is a merely negative test, telling us only what is not true, but never what is. "Where this test does not apply, as in judging philosophical opinions, all genuine progress has been wanting for more than two thousand years" (p. 2). Opinions which can not be tested by experience are only hypotheses; those which can be so tested are theories (p. 127). Philosophy in the sense of metaphysics is made up of hypotheses and lacks all scientific value.

The new theory of knowledge is characterized in three directions. First, in its insistence upon exactness, understood as a complete statement of the conditions under which its propositions are valid. "The form of its statements is therefore not the categorical, but the hypothetical" (pp. viii and 120 f.). Secondly, in opposition to the *Uebergriffe* of the mechanical view of the world, the newer view confines the investigator to the sphere of the experienceable (p. viii). It is the phenomenalistic point of view and follows as a necessary consequence from the principle of exactness. Lastly, the new theory of knowledge believes in 'a careful investigation of the meaning of our own words and constructions' (p. ix). This also follows from the principle of exactness, and this is the particular task of the author's book.

All knowledge is relative. There is no unconditioned absolute knowledge. Hence the possibility of the theory of knowledge as science. It is quite impossible to build a conception of 'thing-in-itself.' All fundamental knowledge bears in itself the form of a relation. A system of truths existing in and for itself and quite independent of the subject is impossible. Every truth or knowledge appears in the first place as the production of some individual. "Subjective conviction (*Ueberzeugung*), not objective certainty, is the only attainable goal of science" (p. 9). Moreover, the problem of science is no other than to be helpful in the acquisition of knowledge. A scientific work is not a magazine of finished and definitely formulated knowledge, but a guide by which to get knowledge—somewhat as a cook-book does not contain the eatables themselves, but guides us in the preparation of them (p. 13). Science mediates knowledge by showing that with the acceptation of some truths the acceptance of others is bound up, but science says nothing as to the necessity of accepting truth in general. We possess certainty in one case upon which such a compulsion rests, namely, immediate experience, the living through any content of consciousness. Science tells us that other certainties are bound up with this immediate certainty of experience. The author wishes to lay before the reader, first, the facts which underlie knowledge; then, a formal conception of knowledge based on these facts, and then its meaning or application. This is the method of physics, and, indeed, of all science properly so called.

"The first fact which meets us is that of the psychic nature of all facts" (p. 18). The physical is at bottom only a few sensations which we by association supplement and project into an 'external' world. "What I have seen is indeed only a few visual sensations" (not a person or a substance) (p. 21). "Thus we see that in our most ordinary expressions we are *arge Hypothesenschmiede*. On the ground of a single visual sensation we propose the hypothesis of having seen a man!" The senses never deceive us, but when we imagine that the senses give us a knowledge of objects error becomes comprehensible. Quoting Mach: "'Not things (bodies), but colors, tones, pressures, spaces, times (what we usually call sensations) are the proper elements of the world' " (p. 22). Among the elements of consciousness we distinguish, first, the different types of sensation; secondly, the memory of these; third, complexes constructed of these two; and fourth, the feelings. The last give unity to consciousness and to the objects which make up its content. Feelings are nearer to us than the other elements, and this is the first important motive for constructing the conceptions of 'I' and the 'outer world.' The 'I' is, however, no mere sum of conscious contents, and is not itself an element of content. The author speaks of the self-activity of the ego (*des Ich*). Other names for it are 'spirit,' 'soul' and 'will,' and 'thought is a function of the will' (p. 32). The 'Ich' is always able to place itself over against its own conscious contents, to manipulate these, observing them more sharply or letting them pass into the background, to analyze them and to compare their parts with each other. This is the 'activity in consciousness' which the author regards as an indisputable fact of fundamental importance. Owing to the feeling of this activity which we possess, the activity itself introduces new elements into the content of consciousness and gives rise to the distinction between given facts and the pure constructions of my spirit (*Willenshandlungen*). The former appear in consciousness without the activity of the mind to assist them; indeed, they appear in spite of it. The latter, I myself bring forth.

'The justification of any concept, then, springs from its availability' or utility (*Benutzbarkeit*) (p. 38), and conception can only deal with actual and possible contents of consciousness. Protagoras was right in interpreting the expression, 'man is the measure of all things,' to mean that the activities and attributes of the human race are the measure of all things. Objective truth or knowledge is a secondary product. Each knowledge has significance primarily only for the individual who produced it. At bottom I know absolutely nothing as to whether outside of me there are other egos or not. My life confines itself to the circle of my consciousness (p. 43). Every act of knowing is a will-act, and thinking is dominated by considerations of economy and simplicity. The activities in which the thinking of the individual consists are the distinguishing of the different, the apprehension of relations of similarity between the different, the analysis of the discovered content to reduce similarity to equivalence, and the synthesis of previously separated elements.

Knowledges are classified first as formal and historical, the former dealing with properties of our memory pictures and imaginings and of all such contents of consciousness as we are able voluntarily to produce, the latter dealing with those contents which present themselves in entire independence of our wills. The formal sciences include logic, arithmetic, the science of combinations, geometry, kinematics, dynamics and and so forth; while the historical, which seek to establish facts or events independent of the will, include the history of humanity, the history of the earth, of the world, descriptions of single objects, geography and to some extent natural history. The real sciences constitute a third class dealing not with facts for their own sake, but with regularities, uniformities and laws. They are physics, chemistry, biology, psychology. Certain typical sciences are discussed in order to get at the principles underlying them. The author treats logic, the theory of number, physics (its principles, presuppositions and goal), the value of hypotheses (as distinct from theories) in physics, and the natural view of the world. All knowledge, even that of logic and mathematics, is hypothetically, not categorically, certain. "It is possible to put forth many theories as to one and the same realm of facts, theories all of which satisfy the demands of admissibility and correctness and are nevertheless distinguishable from each other" (p. 112 f.).

Knowledge has a greater worth practically than theoretically. The discrepancy between the demands of practical living and the limits of strictly scientific investigation gives rise to philosophy, a system of hypotheses which can not be experienced or tested by experience. Hungry men do not wait for science to demonstrate the nutritive value of bread. It is necessary, however, to keep distinct the line of demarcation between science or theory and hypothesis. We owe it to a lucky accident merely that many of our hypotheses define conditions which practical life fulfills. Their fulfillment is something we have not the slightest theoretic reason to expect.

This book is typical of the movement which it represents, in that it voices a demand for the unification of knowledge in a critical theory of the presuppositions and methods of science. One of the most striking characteristics of the development in exact science in the latter half of the nineteenth century is the consciousness of this demand. The author is correct in saying that one of the distinguishing peculiarities of recent science is the attempt to criticize its own presuppositions and constructions. It is characteristic of the movement, too, that it seeks unification and the removal of discrepancies, not in a hypothetical metaphysic, but in a theory of scientific method. Understanding the term to include the theory of all method, we should say there is no other genuine unification of knowledge than this; and if we ask Kant's question, what kind of a world must ours be, seeing that it is knowable, we can only answer by pointing to the contents of the various sciences. For the mind to set about discovering the limits of knowledge by defining a reality which can not be known, as Locke did and as Kant resulted in attempting, is to be misguided by a contradiction. We are as likely to succeed in defining the space which lies beyond all space as in defining the 'being' of substance, *das Ding an sich* or a transcendent absolute.

But the theory of knowledge of this book is founded on what might be called the epistemologist's fallacy, the doctrine that 'all facts are psychic facts,' or, as Mach puts it, that 'not things (bodies), but colors, tones, pressures, spaces, times (what we usually call sensations), are the proper elements of the world.' This is reading into immediate experience (which the author regards as the basis and source of all certainty, the ultimate premise of reflection) certain distinctions which are the results of reflection. To say that all facts are psychic implies that there is something else (*e. g.*, physical) which they might be. Sensations are scientific abstractions; they are not to be confused with the original datum with which reflection begins her task of interpreting immediate experience. It is because of this fallacy that the author is compelled to ascribe to science at last a much lower theoretic than practical value. If the only data of science were the sensational and memory elements entering into the content of consciousness, as Kleinpeter holds, solipsism would necessarily be the final word in our theory of knowledge, and the theoretic value of science would be even lower than our author supposes. For some of the theoretic values which he accepts presuppose the existence of other consciousnesses and other Leibnitzian worlds, a presupposition which, from the author's standpoint, admits of no sort of reflective demonstration.

Moreover, knowledge can possess validity, from this point of view, only for the moment when it arises. The author holds that by giving the conditions under which knowledge arises this difficulty is overcome. "The knowledge which in the first place possesses value only for the moment can acquire a lasting value through the citation of the conditions under which it retains validity (*durch die Angabe der Bedingungen unter denen sie Gültigkeit behält*)." But the author does not maintain that the elements of consciousness (sensations, memories of sensations, complexes of these, and feelings) are things which perdure. He holds that things are reducible to sensations, etc., but the reverse proposition that sensations are things is another matter. He recognizes the intermittent and transient character of the elements of consciousness. What, then, from this point of view, can the conditions under which knowledge retains its validity be? Practically knowledge has value, but a value which we have, on this basis, absolutely no reason to expect and no means of justifying.

Some other points may be barely mentioned at which the author's treatment seems to the reviewer inadequate. His doctrine as to the function of science, that science, like a cook-book, guides us in the attainment of knowledge but does not itself contain or give us the good things on which the intellect subsists, does not convey a definite meaning. Science is a guide in the attainment of further experience, but this is the function of all knowledge, and experience is richer than knowledge. His treatment of objectivity, space and perception seems to the present writer very incomplete—so much so that we get no definite idea from it. His conceptions of immediate experience, and of the will-acts through which knowledge arises, are extremely vague. In the sense in which he uses the term, immediate experience is only a name for the abstract quality of immediacy, and the experiences he seems to regard as immediate (sensations, etc.) are themselves abstractions. The distinction between the physical and the psychical is not clear. The work, in short, is too brief, and although well-conceived, too schematic to be persuasive.

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